FLY ASH
Material for designing building envelope

PRESENTATION BY
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What is building envelope

Building envelope is the structural barrier between the interior and exterior of a building. It is responsible for maintaining climate control within the interior of a building. **Climate control** refers to cooling and heating a building. The building envelope also keeps the interior free from moisture, sound, and light. The building envelope structure includes the:

- Roof,
- Walls,
- Foundation,
- Doors, and
- Windows.

Building envelope material is dependent on the climate, culture, and available resources.

Urbanisation accelerating energy consumption

- Energy is critical, directly or indirectly, in the entire process of evolution, growth and survival of all living beings and it plays a vital role in the socio-economic development and human welfare of a country.
- For a growing economy like India, almost all the macroeconomic models predict that anticipated needs in the future will be large. Rapid urbanization in the country will be one of the most dominant trends in the coming years.
- It is expected that about 40% of the population of India in 2030 would be urban as against 30% in 2008. However in Maharashtra 58% of population will be urban by 2030.

Urbanisation accelerating energy consumption

As per McKinsey, residential floor space is expected to exceed 37 billion square meters in 2030. Commercial buildings is expected to grow to 1.9 billion square meters in 2030. This sector has experienced electricity consumption growth rate of 12%-14% in recent years which is attributed to the increasing electricity consumption in existing buildings as well as increasing energy intensity of newly constructed buildings. Walls are constructed in a building to provide thermal comfort within a building, without compromising the aesthetics of the building. The thermal resistance (R-value) of the wall is crucial as it influences the building energy consumption heavily, especially, in high rise buildings where the ratio between wall and total envelope area is high.

There is need to identify energy efficient building material from available resources.

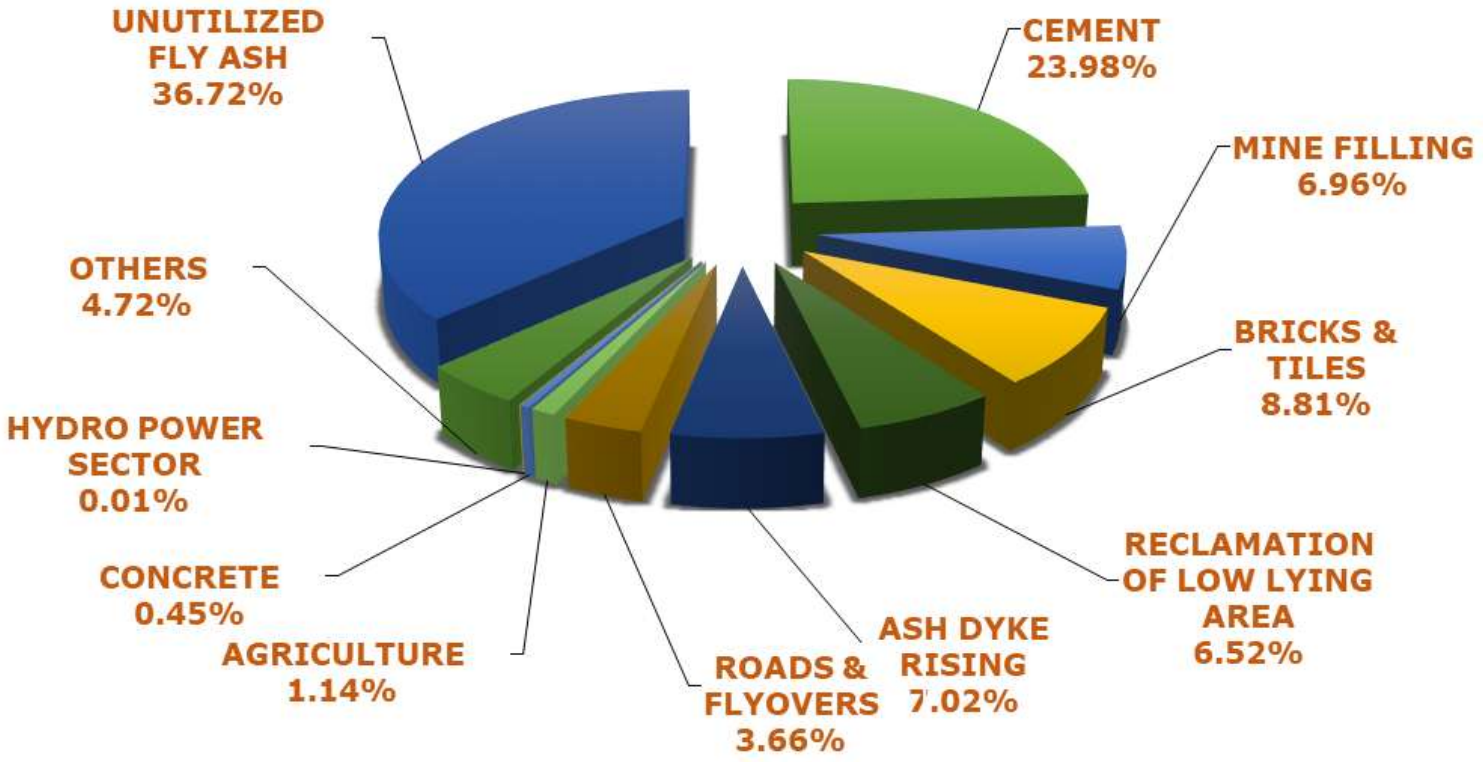
Coal accounts for 57% Power generated in India

- India has vast coal reserve of 211 billion tones making coal the most extensively used fossil fuel for generating power in the country. By 2020 out of which 900 Million Tons (60%) coal is expected to be used for thermal power generation.
- When coal is used as fuel in coal-fired power stations, it is crushed, pulverized and blown into a combustion chamber where it immediately ignites and burns to heat boiler tubes. The inorganic residue components, known commonly as FLY ASH, either remain in the combustion chamber or are carried away by the flue gas stream and collected in Electrostatic Precipitators and flue gas desulfurization system. With 35 % to 50% ash content in Indian Coal about 900 Million Tons ash generation is expected annually by 2031.
- According to USAID ECO-III Project Report, domestic and commercial sectors account for approximately one-third of total electricity consumption and these sectors are likely to consume around 37% of electricity in 2020.

SUMMARY OF FLY ASH GENERATION AND UTILIZATION DURING THE YEAR 2016-17

Description		Year 2016-17
• Nos. of Thermal Power Stations from which data was received	:	**155**
• Installed capacity (MW)	:	**157377.00**
• Coal consumed (Million tons)	:	**509.46**
• Fly Ash Generation (Million tons)	:	**169.25**
• Fly Ash Utilization (Million tons)	:	**107.10**
• Percentage Utilization	:	**63.28**
• Percentage Average Ash Content (%)	:	**33.22**

Major Modes of Fly Ash Utilizatoion during the Year 2016-17



FLY ASH NOTIFICATION

To address the problem of ash disposal and pollution caused by fly ash, Ministry of Environment, Forests and Climate Change (MoEF & CC) has issued various Notifications on fly ash utilization, first Notification was issued on 14th September, 1999 which was subsequently amended in 2003, 2009 and 2016.

The latest notification of 25th January 2016 gave various directions and prescribed target of 100% Fly Ash utilization by 31st December 2017.

- The cost of transportation of ash for road construction projects or for manufacturing of ash based products within a radius of hundred kilometres from a coal or lignite based thermal power plant shall be borne by such coal or lignite based thermal power plant and the cost of transportation beyond the radius of hundred kilometres and up to three hundred kilometres shall be shared equally between the user and the coal or lignite based thermal power plant.

FLY ASH NOTIFICATION

- The coal or lignite based thermal power plants shall promote, adopt and set up (financial and other associated infrastructure) the ash based product manufacturing facilities within their premises or in the vicinity of their premises so as to reduce the transportation of ash.
- The coal or lignite based thermal power plants in the vicinity of the cities shall promote, support and assist in setting up of ash based product manufacturing units so as to meet the requirements of bricks and other building construction materials and also to reduce the transportation.
- It shall be the responsibility of all State Authorities approving various construction projects to ensure that Memorandum of Understanding or any other arrangement for using fly ash or fly ash based products is made between the thermal power plants and the construction agency or contractors.

Government Initiatives

- The State Authorities shall amend Building Bye Laws of the cities having population One million or more so as to ensure the mandatory use of ash based bricks keeping in view the specifications necessary as per technical requirements for load bearing structures.
- For the better management of fly ash waste from thermal power plants across country, Government has reduced the GST rates on fly ash and its products to 5%.
- Further, to facilitate 100% ash utilization by all coal based thermal power plants, a web portal for monitoring of fly ash generation and utilization data of Thermal Power Plants and a mobile based application titled "**ASHTRACK**" has been launched that will help to establish a link between fly ash users and power plants executives for obtaining fly ash for its use in various areas

Government Initiatives

- Since last few years several notifications and guidelines are issued to ameliorate fly ash utilization in the country:
- Design guidelines for use of fly ash in road embankments brought out by Indian Road Congress ("IRC") - IRC SP 58 : 2001;
- Use of fly ash for construction of rural roads has been approved and guidelines issued by IRC (IRC: SP-20 : 2003);
- Revision of IS 3812 : 2003 — the code for specifications of Pulverised Fuel Ash for its use in cement/ mortar/ concrete (part 1) & as fine aggregate (part 2) - approved & under print;

Government Initiatives

- Specifications for other Fly Ash applications viz. (i) lime pozzolana mixture applications, (ii) sintered applications, (iii) geotechnical and (iv) agricultural application are under preparation.
- Updating of IS 456 (2000) - The Plain and Reinforced Concrete - Code of Practice has been updated with use of fly ash.
- Minimum and maximum percentages of fly ash in Portland Pozzolana cement ("PPC") have been increased to 15% and 35% respectively etc.
- Fly ash bricks standard (IS 12894) has been updated.
- Pulverised Fuel Ash-Cement Bricks Specifications IS 16720:2018 published recently.

Maharashtra State Fly Ash Utilisation Policy 2016

- Promoting utilization of Ash in dry form
- Reduce cost of transportation of Ash by setting up Fly Ash based Industrial clusters within vicinity of all Power Plants.
- State Fly ash Council under chairmanship of Chief Secretary
- To fully meet the future needs of the State housing sector for Fly Ash based building material.

Maharashtra State Fly Ash Utilisation Policy 2016

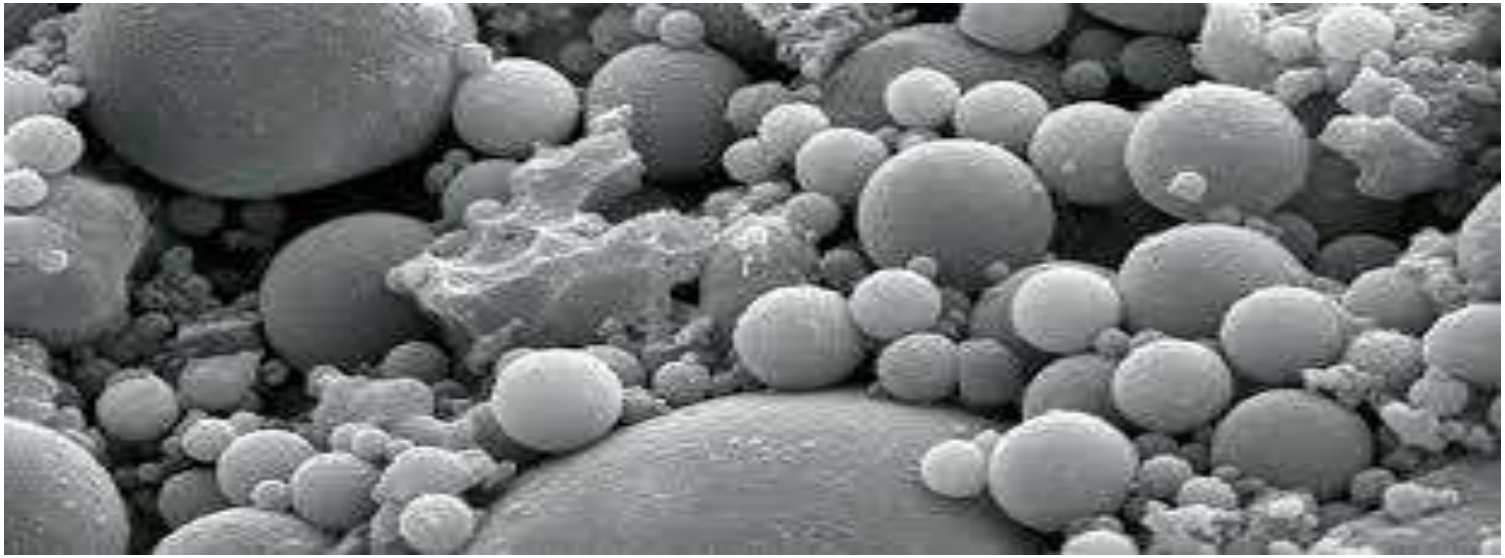
- To achieve 100% Ash Utilisation thereby minimising Health Hazards of Fly Ash
- Promotion of Entrepreneurship and Innovation: To promote the establishment of Knowledge / Resource Centres and Incubation Centres/Fly Ash based Industry Clusters across the State where Fly Ash is available.
- Promotion of Policy through capacity building for eco-friendly management, value addition and utilization of fly ash.


Vertical
Shaft Brick
Kiln

Vertical Shaft Brick Kiln

Each TPS will consider setting up of Cement Manufacturing, Aggregate Manufacturing, Brick/Block Manufacturing, value added products manufacturing through SPV/JV Route in consultation with State Fly Ash Mission:

Entrepreneurs will be encouraged to set up units for valued added product like Cenospheres, Alumina extraction etc.



Power producers will set up units or form JV to manufacture Fly Ash sintered aggregates which will save large quantities of Crushed Stone and sand in ready mix concrete, RMC.

Autoclaved Aerated Concrete (AAC) blocks are produced using materials including silica sand, lime, cement, gypsum, water, fly-ash and aluminum powder. The special combination of these substances yields a material with excellent construction properties such as thermal insulation, structural strength, density and fire resistance.

Geopolymer Fly Ash Sand

DIFFERENT SIZES OF GEOPOLYMER FLYASH SAND

FLY ASH GEOPOLYMER BRICKS

GEOPOLYMER HOLLOW BLOCKS

Light Weight Block

EPS Panel Projects

Train station

Shopping mall

Government building

EPS Panels

EPS Panel House

IRAN MULTILAYER PROJECT

Light Weight EPS Panel Specifications

Items / Panels	Length mm	Width mm	Thickness mm	Density kg/m2
Sandwich Panel	1500~3000	610	60,75,90,120,150,180	45,54,63,81,99,117
Solid Panel	1500~3000	600	60,75,90,120,150,180	41,51,61,81,101,121
Hollow Panel	1500~3000	600	90,120,150,180	33,52,65,77

Light Weight EPS Panel Series

Sandwich Panel

Solid Panel

Reinforce Panel

Hollow Panel

THANK YOU

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